WHAT IS CLAIMED IS:

1. An electromagnetic actuator for actuating a gas-reversing valve on a piston internal combustion engine, comprising:

two electromagnets each including a coil and one yoke body presenting a pole face, the pole faces of the two electromagnets facing each other at a distance, wherein each yoke body has two parallel grooves that are open toward the pole face and form a coil window with the coil disposed in the coil window and the two electromagnets each have a different load profile;

at least one restoring spring; and

an armature arranged to move back and forth between the pole faces counter to a force of the at least one restoring spring.

2. The actuator according to claim 1, wherein the yoke bodies of the respective electromagnets have differently sized pole faces.

3. The actuator according to claim 1, wherein the yoke bodies or the respective electromagnets have coil windows with different dimensions.

4. The actuator according to claim 1, wherein the electromagnets have coil bodies with at least one of different winding numbers and different conductor cross sections.

5. The actuator according to claim 1, wherein the valve is a gas intake valve, one of the electromagnets is a closing magnet and the other of the electromagnets is an opening magnet, and wherein the closing magnet has a higher load profile than the opening magnet.

6. The actuator according to claim 1, wherein the valve is a gas exhaust valve, one of the electromagnets is an opening magnet and the other of the electromagnets is a closing magnet, and wherein the opening magnet has a higher load profile than the closing magnet.

7. The actuator according to claim 1, wherein the armature has opposite surfaces each facing a respective one of the facing pole faces and each armature surface has approximately the same size or dimensions as the respective pole face.